Effect Of La3+ Substitution For Sr2+ On Thephase Formation, Structure And Properties Of (Tl0.5Pb0.5)Sr2Ca2Cu3Oy Compounds

Hamdan, N.M. El-Ghanem, H. Schwartz, J.;Dept. of Phys., King Fahd Univ. of Pet.Miner., Dhahran;

Applied Superconductivity, IEEE Transactions on;Publication Date: Mar 2000;Vol: 10,Issue: 1

Summary

Optimization of the hole concentration in (Tl0.5Pb0.5)Sr2Ca2Cu3 Oy (Tl-1223) was attempted though partial replacement of Sr2+ by La3+. Nine samples with nominal composition (Tl0.5Pb0.5)Sr2-xLax Ca2Cu3Oy were prepared, with x varies from 0 to 2. Magnetization measurements as a function of temperature showed that the transition temperature increased with increasing La content. These measurements also showed an increase of the diamagnetic signal as La was increased. X-ray diffraction patterns of the samples showed that La addition improved the phase purity of Tl-1223 for low level La substitution (x0.03). Formation of impurity phases and a phase transformation were also observed for high La contents. The microstructure appearance of the samples with different La content was different. Samples with x values 0.5, 1 and 2, were very brittle and the pellets dissociated into fine powder in one week time. These results will be discussed in terms of changes in the charge carrier concentration in the Cu-O planes of the originally overdoped Tl-1223 high temperature superconductors